

REMARKS

Reconsideration and allowance of the present application are respectfully requested. Claims 1-20, 22, 23, 25, 27, 28, 30, 32 and 33 remain pending in the application. By the foregoing amendment, claims 1-3, 5, 6, 8, 10, 12, 13, 18, 20, 22, 25, 27, 30 and 32 are amended; and claims 21, 24, 26, 29, 31 and 34 are canceled.

Applicants note with appreciation the Examiner's indications on page 6 of the final Office Action that claim 11 is allowed; and claims 3-7, 23, 24, 26, 28, 29, 13-20 and 33 contain allowable subject matter. In light of the Examiner's rejection of claim 7 under 35 U.S.C. §103(a) on page 6 of the Office Action, Applicants respectfully request clarification regarding patentability of claim 7.

Regarding independent claims 10, the claim is amended to incorporate the combined allowable subject matters of claims 26 and 29. Independent claims 1, 8 and 12 are similarly amended.

On page 2 of the final Office Action, the Examiner rejects claims 1-10 and 12-34 under 35 U.S.C. §112, first paragraph, alleging failure to comply with the written description requirement. To address the Examiner's concerns, the relevant claims are amended. Withdrawal of the rejection under 35 U.S.C. §112, first paragraph, is respectfully requested.

On page 3 of the Office Action, independent claims 1 and 8, along with dependent claim 8, are rejected as being anticipated by SU 1762346 (SU '346). On page 3 of the Office Action, independent claims 1, 8 and 12, along with various dependent claims, are rejected as being anticipated by SU 1485331 (SU '331). On page 4 of the Office Action, independent claims 1, 8, 10 and 12, along with various dependent claims, are rejected as being anticipated by UK 706,716 (UK '716). On

page 6 of the Office Action, dependent claim 7 is rejected as being unpatentable over UK '716 in view of U.S. Patent 6,016,122 (Malone et al.). These rejections are respectfully traversed.

An inline phase shifter is disclosed. Included with the device are a waveguide and at least one electromechanical means for changing a physical dimension of a waveguide path. As shown in Figs. 1 and 2, a waveguide 102 has at least one electrically conducting surface and a waveguide path. At least one electromechanical means 106, 108, 110, 112, 114 and 116 can be used to change a physical dimension of a waveguide path to phase shift a signal which travels along the waveguide path, such as a piezoelectric device 310 as shown in Fig. 3, or an electrostatically actuated shutter 524, 526 as shown in Figs. 5 and 6 (e.g., specification at paragraph [0029]). In either case, an electromechanical means has a moveable shutter for changing a physical dimension of the waveguide path (e.g., specification at paragraphs [0019] and [0029]).

The foregoing features are broadly encompassed by claim 1 which recites, among other features, an inline phase shifter comprising, among other features, at least one electromechanical means for changing a physical dimension of the waveguide path to phase shift a signal which travels along a waveguide path, wherein the at least one electromechanical means comprises at least one of a piezoelectric element with a moveable shutter and an electrostatically actuated shutter.

The Examiner indicated that the piezoelectric subject matter of claim 26, and the electrostatically actuated shutter subject matter of claims 24 and 29 are allowable. Independent claim 1 has been amended to incorporate "at least one

electromechanical means for changing a physical dimension of the waveguide path to phase shift a signal which travels along a waveguide path, wherein the at least one electromechanical means comprises at least one of a piezoelectric element with a moveable shutter and an electrostatically actuated shutter." Applicants respectfully submit that references SU '346, SU '331, UK '716, and the Malone et al. patent do not teach or suggest these features deemed allowable by the Examiner.

SU '346 discloses a waveguide (1) in which a disc set rotates about a control axis, but the SU '346 reference does not relate to piezoelectric elements nor electrostatically actuated shutters. Accordingly, the SU '346 reference does not teach or suggest "at least one electromechanical means for changing a physical dimension of the waveguide path to phase shift a signal which travels along a waveguide path, wherein the at least one electromechanical means comprises at least one of a piezoelectric element with a moveable shutter and an electrostatically actuated shutter," as recited in claim 1.

SU '331 discloses a microwave range phase-splitter in which a piezoelectric element (2) controllably bends a laterally resting metal strip (4). However, the SU '331 reference does not teach or suggest any moveable shutter that changes a waveguide path. Accordingly, the SU '331 reference does not teach or suggest "at least one electromechanical means for changing a physical dimension of the waveguide path to phase shift a signal which travels along a waveguide path, wherein the at least one electromechanical means comprises at least one of a piezoelectric element with a moveable shutter and an electrostatically actuated shutter," as recited in claim 1.

UK '716 discloses a dielectric wave guide 20 having fixed barrier plates 22 and 23, but the UK '716 reference does not teach or suggest any moveable shutter that changes a waveguide path. Accordingly, the UK '716 reference does not teach or suggest "at least one electromechanical means for changing a physical dimension of the waveguide path to phase shift a signal which travels along a waveguide path, wherein the at least one electromechanical means comprises at least one of a piezoelectric element with a moveable shutter and an electrostatically actuated shutter," as recited in claim 1.

The Malone et al. reference was applied by the Examiner for its disclosure of a phased array antenna using piezoelectric actuators, but the Malone et al. reference does not teach or suggest "at least one electromechanical means for changing a physical dimension of the waveguide path to phase shift a signal which travels along a waveguide path, wherein the at least one electromechanical means comprises at least one of a piezoelectric element with a moveable shutter and an electrostatically actuated shutter," as recited in claim 1.

Claim 8 similarly recites "changing physical dimensions of a waveguide path by actuating an electromechanical device; and inputting a signal along the waveguide path to output a phase shifted signal, wherein the electromechanical device comprises at least one of a piezoelectric element with a moveable shutter and an electrostatically actuated shutter." Claim 10 incorporates the allowable subject matter of "wherein each of the plurality of electromechanical devices comprises at least one of a piezoelectric element and an electrostatically actuated shutter." Claim 12 similarly recites "at least one micro-electromechanical device positioned sufficiently adjacent to the waveguide path to change a physical dimension of the

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